

### ABSTRACT OF THE DISCLOSURE

A piezoelectric resonator is disclosed. In one embodiment the piezoelectric resonator includes a resonating member having a bi-directionally adjustable resonance frequency, the resonating member including a semiconductor material of a semiconductor-on-insulator wafer, the semiconductor-on-insulator wafer including an oxide layer adjacent to the semiconductor material and a handle layer adjacent to the oxide layer, the oxide layer disposed between the handle layer and the semiconductor material, an electrode, and a piezoelectric material disposed between the semiconductor material and the electrode, and a capacitor created by the semiconductor material and the handle layer separated by an air gap formed out of the oxide layer, wherein the capacitor is configured to receive a direct current voltage that adjusts the resonance frequency of the resonating member. ~~semiconductor material, an electrode, and a piezoelectric material disposed between the semiconductor material and the electrode.~~